TRAINING PROGRAM OF INSTRUCTION (TPI)
FOR
DINFOS-BRTSM

BROADCAST RADIO AND TELEVISION SYSTEMS MAINTENANCE COURSE

Approved by:

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COL, Commandant
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BROADCAST RADIO AND TELEVISION SYSTEMS MAINTENANCE COURSE

TRAINING PROGRAM OF INSTRUCTION

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TRAINING PROGRAM OF INSTRUCTION
Preface

TRAINING PROGRAM OF INSTRUCTION FILE NUMBER (TPFN):
DINFOS-BRTSM

TITLE: Broadcast Radio and Television Systems Maintenance Course

TRAINING LOCATION: Fort George G. Meade, Maryland

SPECIALTY AWARDED: USN NEC - 4747

PURPOSE: To provide an advanced course of instruction for broadcast radio and television systems engineers. Designed to target the training of skills and knowledge to support studio production and broadcast missions of the armed services and American Forces Radio and Television Service.

COURSE DESCRIPTION: Develops the professional broadcast radio and television maintenance specialist from an apprentice to journeyman level of competence. This advanced course of instruction is designed to provide in-depth exploration of the principles and technological application in the following functional areas: broadcast television systems, audio, camera, video tape recorder, studio, transmission systems, microprocessor technology, non-linear editors and a contingency (field) training exercise.

PREREQUISITES:

Army - 25R20 and above
Navy - NEC – 4746 (or NEC 4743 with a waiver approved through the Naval Media Center, approved by the DINFOS Commandant)
Air Force - AFSC – 2E1X4
International student attending this course must have an ECL of 75. Must have normal color vision; cannot have acrophobia, be claustrophobic or have vertigo

SECURITY CLEARANCE: None

CLASS SIZE:

MAXIMUM	8
MINIMUM	3
ANNUAL COURSE CAPACITY	40 STUDENTS

COURSE LENGTH: 74 Training Days

ACADEMIC HOURS 581

ADMINISTRATIVE HOURS	11
TOTAL COURSE HOURS	592

INSTRUCTOR CONTACT HOURS: 1018

TYPE/METHOD OF INSTRUCTION:

Administrative (AD) -	11.00
Lecture (L) -	167.25
Demonstration (D) -	23.00
Computer Aided Instruction (CAI) -	10.00
Performance Exercise (PE) -	218.75
Examinations	
Performance (EP) -	131.25
Written (EW) -	41.75

TRAINING START DATE: 06 May 2006

ENVIRONMENTAL IMPACT: None. DoD policy was followed to assess the environmental impact.

MANPOWER: The Inter-service Training Review Organization (ITRO) formula was used to determine the number of instructors required.

EQUIPMENT AND FACILITIES: The Course Design Resource Estimate (CDRE) contains this information.

TRAINING DEVELOPMENT PROPONENT: The Defense Information School (DINFOS), Directorate of Training, Course Development Department (CDD): 301-677-4420; DSN 622-4420.

FUNCTIONAL AREA 1
FUNDAMENTALS OF BROADCAST TELEVISION SYSTEMS

TPFN: DINFOS-BRTSM-001-001

UNIT TITLE: Video Signal Characteristics

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Identify each section of the composite video signal, function of each section, and how each section interacts with the complete composite video signal. Composite video sections covered include the horizontal and vertical blanking intervals and active video. Student will identify the development of the TV signal from its inception through black and white broadcasting and color broadcasting. Student will identify color TV standards, and discuss how the current standards came into existence. Standards covered include NTSC, FCC, and RS-170A. See TPFN 001-002 of this functional area for measuring student progress.

INSTRUCTIONAL TYPE AND HOURS: 13L

TOTAL INSTRUCTIONAL HOURS: 13

PREREQUISITE TPFN(S): None

TASK(S):
001- Identify composite color video signal (characteristics)
002- Identify NTSC standards
003- Identify principles of colorimetry
004- Identify digital compression techniques
005- Define bit-error rate and testing

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None

REFERENCES: National Association of Broadcasters Engineering Handbook, Eighth Edition

FUNCTIONAL AREA 1
FUNDAMENTALS OF BROADCAST TELEVISION SYSTEMS

TPFN: DINFOS-BRTSM-001-002

UNIT TITLE: Student Progress Measurement

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): A brief review of the material in Unit 1 will be conducted to assess the student's comprehension and clarify key points prior to administering the written exam. Student competency will be assessed on comprehension. Student must correctly answer a minimum of 70% of the questions on the written exam.

INSTRUCTIONAL TYPE AND HOURS: 2 L; 1 EW

TOTAL INSTRUCTIONAL HOURS: 3

PREREQUISITE TPFN(S): All previous TPFNs

TASK(S): 001- Review fundamentals of the TV signal

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None

REFERENCES: National Association of Broadcasters Engineering Handbook, Eighth Edition

FUNCTIONAL AREA 2
MICROPROCESSORS

TPFN: DINFOS-BRTSM-002-001

UNIT TITLE: Principles of Microprocessors

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Analyze the fundamentals of modern PCs, Macintosh, and servers, to include: components, types, functions, capabilities, and connections of PCs, Macintosh, and servers to communicate with peripherals. Student competency will be assessed through written examinations that require the student to obtain a score of no less than 70 percent.

INSTRUCTIONAL TYPE AND HOURS: 20 L; 4 EW

TOTAL INSTRUCTIONAL HOURS: 24

PREREQUISITE TPFN:

TASK(S):
001- Identify fundamentals of modern-day PCs/Macintoshes and servers
002- Describe basic architecture of modern PCs/Macintoshes and servers
003- Identify communication ports to include USB & fire wire
004- Identify network architecture

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None

REFERENCES: A+ Certification: Core Hardware (New Horizons), A+ Certification: Operating Systems (New Horizons) and How MACS work.

FUNCTIONAL AREA 2
MICROPROCESSORS

TPFN: DINFOS-BRTSM-002-002

UNIT TITLE: Assemble, Interconnect, and Check Microprocessors

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Set up, configure individual PCs and Macintosh computers. The student will establish a network/LAN. Additionally, students will perform system checks and upgrades. Student competency will be measured through performance examinations that require the student to complete the tasks in accordance with manufacturers' specifications and/or industry-established guidelines for the equipment.

INSTRUCTIONAL TYPE AND HOURS: 4 D; 21 PE; 7 EP

TOTAL INSTRUCTIONAL HOURS: 32

PREREQUISITE TPFN: DINFOS-BRTSM-002-001

TASK(S):
001- Set up, construct cables, wire, & configure a LAN, using PCs/Macintoshes and servers
002- Perform internal checks/upgrade PCs/Macintoshes

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: A+ Certification: Core Hardware (New Horizons), A+ Certification: Operating Systems (New Horizons) and How MACS work.

FUNCTIONAL AREA 3
NON-LINEAR EDITORS

TPFN: DINFOS-BRTSM-003-001

UNIT TITLE: Functions of Non-Linear Editors (NLEs)

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Student will identify the basic functions of NLEs and the configuration of NLEs. Student competency will be assessed through written examinations that require the student to obtain a score of no less than 70 percent.

INSTRUCTIONAL TYPE AND HOURS: 19 L; 3 EW

TOTAL INSTRUCTIONAL HOURS: 22

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001- Identify basics of NLE
002- Identify the configuration (process) NLEs

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None

REFERENCES: Operation and maintenance manuals.

FUNCTIONAL AREA 3
NON-LINEAR EDITORS

TPFN: DINFOS-BRTSM-003-002

UNIT TITLE: NLE Set Up, Configuration, and Troubleshooting

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): The student will perform the initial set up and configuration of NLEs. They will also troubleshoot NLEs. Student competency will be measured through performance examinations that require the student to complete the tasks in accordance with the manufacturers' specifications.

INSTRUCTIONAL TYPE AND HOURS: 3 D; 12 PE; 3 EP

TOTAL INSTRUCTIONAL HOURS: 18

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001- Set up and configure NLEs
002- Troubleshoot NLEs

INSTRUCTOR/STUDENT RATIO: 1:8 (D); 1:4 (PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: Operation and maintenance manuals.

FUNCTIONAL AREA 4
CAMERA SYSTEMS

TPFN: DINFOS-BRTSM-004-001

UNIT TITLE: Functions of the Television Camera and Camera Back

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Identify principles associated with the camera and principles associated with the optical system using Charged Coupled Devices (CCD) cameras. The student will analyze the different read/write capabilities and digital compression format of digital camera backs. Student competency will be assessed through written examinations that require the student to obtain a score of no less than 70 percent.

INSTRUCTIONAL TYPE AND HOURS: 12.5 L; 4 EW

TOTAL INSTRUCTIONAL HOURS: 16.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Identify principles of optical system
002- Identify camera & camera back principles.
003- Identify video compression and read/write capability of digital camera back

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None

REFERENCES: Operation and maintenance manuals.

FUNCTIONAL AREA 4
CAMERA SYSTEMS

TPFN: DINFOS-BRTSM-004-002

UNIT TITLE: Television Camera Circuitry & Operations Checks

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Operationally check the portable camera and camera back. Each student will practice using various test charts. The student will also analyze the color camera circuitry using block diagrams. Student competency will be measured through performance examinations that require the student to complete the tasks in accordance with the manufacturer's specifications.

INSTRUCTIONAL TYPE AND HOURS: 1 D; 14 PE; 5 EP

TOTAL INSTRUCTIONAL HOURS: 20

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001- Perform operational check of (digital) camera and camera back
002- Analyze circuit cards (block diagrams)

INSTRUCTOR/STUDENT RATIO: 1:8 (D); 1:4 (PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: Operation and maintenance manuals.

FUNCTIONAL AREA 4
CAMERA SYSTEMS

TPFN: DINFOS-BRTSM-004-003

UNIT TITLE: Maintenance and Repair

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): The student will practice aligning cameras to specification in accordance with the maintenance manual. The student will also troubleshoot cameras to board level. Student competency will be measured through performance examination that require the student to complete the tasks in accordance with the manufacturer's specifications.

INSTRUCTIONAL TYPE AND HOURS: 3 D; 17.5 PE; 7 EP

TOTAL INSTRUCTIONAL HOURS: 27.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001- Perform camera system alignments
002- Perform troubleshooting procedures to board level

INSTRUCTOR/STUDENT RATIO: 1:8 (D); 1:4 (PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: Operation and maintenance manuals.

FUNCTIONAL AREA 5
VIDEOTAPE RECORDERS (VTR)

TPFN: DINFOS-BRTSM-005-001

UNIT TITLE: Fundamentals of VTR Operation

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Identify videotape recorder principles. The students will cover VTR circuitry to the block level. These circuits will include; system control, servo systems, signal processing, audio, power supply, and time-base correctors (TBCs). Student competency will be assessed through written examinations that require the student to obtain a score of no less than 70 percent.

INSTRUCTIONAL TYPE AND HOURS: 23 L, 3PE, 1 EW

TOTAL INSTRUCTIONAL HOURS: 27

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Identify video recorder (VCR) principles
002- Perform operations check on a videotape recording system
003- Identify VTR circuits (block level) to include: system control, servos, signal processing, audio, power supply, and time-base correctors (TBCs)

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None.

REFERENCES: Manufacturer's operations and technical manuals; schematic diagrams.

FUNCTIONAL AREA 5
VIDEOTAPE RECORDERS (VTR)

TPFN: DINFOS-BRTSM-005-002

UNIT TITLE: VTR Maintenance and Repair

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Operationally check a videotape recording system. The student also performs mechanical and electrical alignments IAW established standards. Finally, students will troubleshoot a videotape recording system to the sub-assembly level. Student competency will be measured through performance examinations that require the student to complete the tasks in accordance with the manufacturer's specifications.

INSTRUCTIONAL TYPE AND HOURS: 2 D; 28.5 PE; 6.5 EP

TOTAL INSTRUCTIONAL HOURS: 37

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Perform select mechanical alignments
002- Perform select electrical alignments
003- Perform troubleshooting to sub-assembly level

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: Manufacturer's operations and technical manuals; schematic diagrams.

FUNCTIONAL AREA 6
AUDIO SYSTEMS

TPFN: DINFOS-BRTSM-006-001

UNIT TITLE: Principles of Audio Systems and Standards

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Identify the principles of broadcast audio systems and the standards that pertain to those systems. The student will measure audio to ensure compliance with standards. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete the performance tasks in accordance with DOD/AFRTS standards of engineering practices.

INSTRUCTIONAL TYPE AND HOURS: 3 L; .25 D; 1.5 PE; 1 EW; .25 EP

TOTAL INSTRUCTIONAL HOURS: 6

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Identify principles of broadcast audio (systems) standards
002- Measure audio (to) standards IAW DOD engineering practices (current edition)

INSTRUCTOR/STUDENT RATIO: 1:8 (L, D, EW) 1:4 (PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: DOD/AFRTS Handbook of Engineering Standards and Practices; manufacturer's operations and technical manuals; schematic diagrams.

FUNCTIONAL AREA 6
AUDIO SYSTEMS

TPFN: DINFOS-BRTSM-006-002

UNIT TITLE: Audio Consoles and External Equipment

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Analyze the operation of audio consoles. The student will identify the remote start and stop capabilities of external equipment. The student will then perform an alignment of an audio console IAW established standards. Finally students will identify radio remote concepts. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete the performance tasks in accordance with the manufacturer's specifications.

INSTRUCTIONAL TYPE AND HOURS: 3 L; .50 D; 4 PE; 1 EW; 1 EP

TOTAL INSTRUCTIONAL HOURS: 9.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Analyze the operation of audio consoles
002- Identify remote start/stop of external equipment
003- Perform an alignment of an audio console
004- Identify Radio Remote concept

INSTRUCTOR/STUDENT RATIO: 1:8 (L, D, EW) 1:4 (PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: Manufacturer's operations and technical manuals; schematic diagrams.

FUNCTIONAL AREA 6
AUDIO SYSTEMS

TPFN: DINFOS-BRTSM-006-003

UNIT TITLE: Audio Distribution and Processing

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Analyze the operations of audio distribution and processing systems. The student will perform alignments of those systems and then troubleshoot the systems. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete the performance tasks in accordance with the manufacturers' specifications.

INSTRUCTIONAL TYPE AND HOURS: 1.5 L; .50 D; 3.5 PE; .50 EW; 1.5 EP

TOTAL INSTRUCTIONAL HOURS: 7.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001- Analyze principles and operations of audio distribution and processing systems
002- Perform alignment of audio distribution and processing systems
003- Perform troubleshooting of audio distribution and processing systems

INSTRUCTOR/STUDENT RATIO: 1:8 (L, D, EW) 1:4 (PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: Manufacturer's operations and technical manuals; schematic diagrams.

FUNCTIONAL AREA 6
AUDIO SYSTEMS

TPFN: DINFOS-BRTSM-006-004

UNIT TITLE: Digital Audio Theory

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Analyze the operations of digital audio recorders to the block level. The student will then analyze the interface configurations of the digital audio recorders. Finally, he or she will identify storage capabilities and types of media associated with digital audio recorders. Student competency will be assessed through written examinations that require the student to obtain a score of no less than 70 percent.

INSTRUCTIONAL TYPE AND HOURS: 3 L; 1.50 EW

TOTAL INSTRUCTIONAL HOURS: 4.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001- Analyze interface configurations
002- Identify storage/media types

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None.

REFERENCES: Manufacturer's operations and technical manuals; schematic diagrams.

FUNCTIONAL AREA 6
AUDIO SYSTEMS

TPFN: DINFOS-BRTSM-006-005

UNIT TITLE: Audio Automation

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Identify the principles of audio automation. The student will analyze the operation and configuration (to block level) and discuss remote cueing and formats. The student will learn the installation procedures of the Audio-Vault system and perform the actual installation. He or she will then operationally check and troubleshoot the system. The student will also identify and perform voice tracking. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete the performance tasks in accordance with the manufacturer's specifications.

INSTRUCTIONAL TYPE AND HOURS: 7.5 L; 13.5 PE; 2.5 EW; 9.5 EP

TOTAL INSTRUCTIONAL HOURS: 33

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Identify principles of audio automation
002- Analyze operation and configuration (block diagram)
003- Analyze remote cueing, formats and techniques
004- Identify installation procedures of the Audio Vault
005- Perform installation of the Audio Vault
006- Perform operations checks of an automation system (Audio Vault)
007- Perform troubleshooting procedures to sub-assembly
008- Identify principles of audio voice tracking
009- Perform an operations check of voice tracking

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW) 1:4 (PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: Manufacturer's operations and technical manuals; schematic diagrams.

FUNCTIONAL AREA 6
AUDIO SYSTEMS

TPFN: DINFOS-BRTSM-006-006

UNIT TITLE: Digital Audio Editors

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Identify the principles of digital audio editors. The student will perform an operational check of the system and troubleshoot the system for malfunctions. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete the performance tasks in accordance with the manufacturer's specifications.

INSTRUCTIONAL TYPE AND HOURS: 2.5 L; 6 PE; 1 EW; 2 EP

TOTAL INSTRUCTIONAL HOURS: 11.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Identify principles of digital audio editors
002- Perform operational checks
003- Perform troubleshooting procedures

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW) 1:4 (PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: Manufacturer's operations and technical manuals; schematic diagrams.

FUNCTIONAL AREA 7
STUDIO SYSTEMS

TPFN: DINFOS-BRTSM-007-001

UNIT TITLE: Signal Paths and Signal Timing

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Identify the principles of the various switchers used in the broadcast studio environment. The student will analyze the timing and phasing of the systems and perform the actual timing and phasing of a studio. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete the performance tasks in accordance with industry (NTSC) standards and the manufacturers' specifications.

INSTRUCTIONAL TYPE AND HOURS: 1.75 L; 3 PE; 1.75 EW; 3 EP

TOTAL INSTRUCTIONAL HOURS: 9.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Analyze principles of switchers (routing, master control, bridging, and production)
002- Analyze system timing and subcarrier phasing
003- Perform system timing and subcarrier phasing

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW) 1:4 (PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: NAB Handbook of Engineering Practices; Manufacturers' operations and technical manuals; schematic diagrams.

FUNCTIONAL AREA 7
STUDIO SYSTEMS

TPFN: DINFOS-BRTSM-007-002

UNIT TITLE: Television Graphics and Digital Video Effects (DVE)

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Analyze the principles of TV graphics and DVE equipment. The student will perform operational checks of the equipment and troubleshoot the equipment to isolate malfunctions. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete all performance tasks in accordance with the manufacturers' specifications.

INSTRUCTIONAL TYPE AND HOURS: 1.5 L; 2.5 PE; .5 EW; 4 EP

TOTAL INSTRUCTIONAL HOURS: 8.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Analyze principles of TV graphics & DVE equipment
002- Perform operational checks of TV graphics & DVE equipment
003- Troubleshoot TV graphics & DVE equipment to sub-assembly level

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW) 1:4 (PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: Manufacturer's operations and technical manuals; schematic diagrams.

FUNCTIONAL AREA 7
STUDIO SYSTEMS

TPFN: DINFOS-BRTSM-007-003

UNIT TITLE: Studio Production Preparation

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Identify the principles of acoustics for broadcast applications and television studio lighting systems. The student will perform camera and camera control unit (CCU) systems set-up and color balance camera systems. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete all performance tasks in accordance with manufacturer's specifications and industry (NTSC) standards.

INSTRUCTIONAL TYPE AND HOURS: 1.5 L; 7 PE; 1 EW; 7.5 EP

TOTAL INSTRUCTIONAL HOURS: 17

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Identify principles of acoustics for broadcast applications
002- Identify principles of television studio lighting systems
003- Perform camera/camera control unit (CCU) system set-up
004- Perform color balance on camera systems

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW) 1:4 (PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: Manufacturer's operations and technical manuals; NAB Engineering Handbook; schematic diagrams.

FUNCTIONAL AREA 7
STUDIO SYSTEMS

TPFN: DINFOS-BRTSM-007-004

UNIT TITLE: TV Studio Automation Systems

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Analyze the principles of TV automation systems. The students will perform operational checks and preventive maintenance of TV automation systems. He or she will then troubleshoot TV automation systems to the sub-assembly level. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete all performance tasks in accordance with manufacturer's specifications.

INSTRUCTIONAL TYPE AND HOURS: .5 L; 12 PE; .5 EW; 8 EP

TOTAL INSTRUCTIONAL HOURS: 21

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Analyze principles of TV automation systems
002- Perform operational checks of TV automation systems
003- Perform preventive and database maintenance (Collective task)
004- Troubleshoot to sub-assembly level

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EW) 1:4 (PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: Manufacturer's operations and technical manuals; schematic diagrams.

FUNCTIONAL AREA 7
STUDIO SYSTEMS

TPFN: DINFOS-BRTSM-007-005

UNIT TITLE: Studio Design and Interoperability

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): As part of a maintenance team, the students will be required to plan the interconnection of a broadcast system, including audio and video equipment. Students will then be required to document the facility design. Next the team will interconnect and test the system design and equipment. Team training is completed with an instructor-led review and critique. This technique has the students first describe what the team and the individuals performed well, not so well, and how to improve their performance. Instructor observations are added to complete this phase of the training. Finally, each student will be required to troubleshoot the installed broadcast system. Student competency will be assessed through performance examinations that require the student to complete the tasks in accordance with DOD/AFRTS standards of engineering practices and industry (NTSC) standards.

INSTRUCTIONAL TYPE AND HOURS: 1 L; 16 PE; 21 EP

TOTAL INSTRUCTIONAL HOURS: 38

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Plan the interconnection of a broadcast system to include audio and video equipment layout (Collective task)
002- Document facility design (Collective task)
003- Interconnect and test (Collective task)
004- Troubleshoot installed broadcast system

INSTRUCTOR/STUDENT RATIO: 1:8 (L) 1:4 (PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: AFRTS Engineering Handbook; NAB Handbook

FUNCTIONAL AREA 8
BROADCAST TRANSMISSION SYSTEMS

TPFN: DINFOS-BRTSM-008-001

UNIT TITLE: Fundamentals of Broadcast Transmission

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Analyze the fundamentals of radio frequency (RF) theory to include RF wave propagation and signal loss, signal measurements and calculations of Effective Radiated Power, Voltage Standing Waves and reflected power. The student will be able to identify transmission line characteristics of impedance, frequency vs. size and types of specialized RF connectors. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete the performance tasks in accordance with DOD/AFRTS standards of engineering practices and industry (NTSC) standards.

INSTRUCTIONAL TYPE AND HOURS: 7.5 L; 3 EW; 2.75 PE; .75 EP

TOTAL INSTRUCTIONAL HOURS: 14

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Analyze broadcast transmission fundamentals, wave propagation and loss, signal measurement, and units of measurement
002- Identify transmission line characteristics of impedance, frequency, and size & type of specialized radio frequency (RF) connectors
003- Calculate effective radiated power (ERP) and Voltage Standing Wave Ratio (VSWR)/ reflected power
004- Identify tower safety, grounding and general inspection

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None.

REFERENCES: NAB Engineering Handbook; Principles of Electronic Communications; AFRTS Handbook of Engineering Practices

FUNCTIONAL AREA 8
BROADCAST TRANSMISSION SYSTEMS

TPFN: DINFOS-BRTSM-008-002

UNIT TITLE: Principles of Antennas

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Analyze principles and theory of operation for antennas, the different types of antennas used for television and radio broadcast. He or she will learn how to determine the best site selection practices, coverage area above height (HAAT), and coupling and phasing use in multi tower systems. Student competency will be assessed through written examinations that require the student to obtain a score of no less than 70 percent.

INSTRUCTIONAL TYPE AND HOURS: 3 L; 1 EW

TOTAL INSTRUCTIONAL HOURS: 4

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001- Analyze antenna principles, types, coverage area, height above average terrain, site selection, polarization coupling and phasing

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None.

REFERENCES: NAB Engineering Handbook; Principles of Electronic Communications;

FUNCTIONAL AREA 8
BROADCAST TRANSMISSION SYSTEMS

TPFN: DINFOS-BRTSM-008-003

UNIT TITLE: AM Transmission and Transmitters

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Identify the principles of the AM signal using a spectrum analyzer and tuning for best performance of the modulated waveform. The student will perform a proof of performance operational check of an AM transmitter. Aligning and troubleshooting an AM transmitter follow this. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete the performance tasks in accordance with DOD/AFRTS and industry (NTSC) standards, and manufacturer's specifications.

INSTRUCTIONAL TYPE AND HOURS: 7 L; 1 EW; 2 D; 15.5 PE; 6.5 EP

TOTAL INSTRUCTIONAL HOURS: 32

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Identify principles of amplitude modulation (AM), tuning for best modulation performance, proof of performance, input/output tuning, matching and loading, centering band pass filters/effects on sidebands, antenna impedance tuning and loading, and optimum tuning vs. efficiency
002- Use a Spectrum Analyzer
003- Perform Proof of Performance operations check
004- Perform transmitter alignment
005- Perform troubleshooting procedures to the sub-assembly

INSTRUCTOR/STUDENT RATIO: 1:8 (L, D, EW) 1:4 (D, PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: DOD/AFRTS Standards of Engineering Practices (current edition); NAB Engineering Handbook; Principles of Electronic Communications; Manufacturers' operations and technical manuals

FUNCTIONAL AREA 8
BROADCAST TRANSMISSION SYSTEMS

TPFN: DINFOS-BRTSM-008-004

UNIT TITLE: FM Transmission and Transmitters

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Analyze the FM signal for best performance and perform a proof of performance operational check of an FM transmitter. The student will align an FM transmitter and perform troubleshooting procedure exercise. He or she will learn how to use a field strength meter and perform field strength measurements. The student must obtain a score of no less than of 70 percent on written exams and complete the performance tasks in accordance with DOD/AFRTS and industry (NTSC) standards, and manufacturer's specifications.

INSTRUCTIONAL TYPE AND HOURS: 4 L; 1 EW; 2 D; 15 PE; 4.5 EP

TOTAL INSTRUCTIONAL HOURS: 26.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Analyze principles of frequency modulation (FM) and antenna impedance, tuning, and loading
002- Perform Proof of Performance operations check
003- Perform alignment
004- Identify field strength measurement concepts
005- Perform field strength measurements
006- Perform troubleshooting procedures to the sub-assembly level

INSTRUCTOR/STUDENT RATIO: 1:8 (L, D, EW) 1:4 (D, PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: DOD/AFRTS Standards of Engineering Practices (current edition); NAB Engineering Handbook; Principles of Electronic Communications; Manufacturers' operations and technical manuals

FUNCTIONAL AREA 8
BROADCAST TRANSMISSION SYSTEMS

TPFN: DINFOS-BRTSM-008-005

UNIT TITLE: TV Transmission and Transmitters

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Analyze the principles of analog TV transmission and the schematics of a TV transmitter. The student will analyze signals for best performance and conduct a proof of performance operational check of a TV transmitter. He or she will align and troubleshoot a TV transmitter. Student will learn how to measure transmission standards IAW DOD engineering standards. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete all performance tasks in accordance with DOD/AFRTS standards of engineering practices and manufacturer's specifications.

INSTRUCTIONAL TYPE AND HOURS: 4.5 L; 1.5 EW; 1.25 D; 10.5 PE; 3.25 EP

TOTAL INSTRUCTIONAL HOURS: 21

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Analyze principles of analog TV signal transmission
002- Analyze TV transmission system schematics, antenna impedance, tuning, and loading
003- Perform proof of performance operations check
004- Measure transmission standards IAW DoD engineering standards (current edition)
005- Perform transmitter alignment
006- Perform troubleshooting procedures to sub-assembly

INSTRUCTOR/STUDENT RATIO: 1:8 (L, D, EW) 1:4 (D, PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: NAB Engineering Handbook; Principles of Electronic Communications; AFRTS Handbook of Engineering Practices; Manufacturers' operations and technical manuals

FUNCTIONAL AREA 8
BROADCAST TRANSMISSION SYSTEMS

TPFN: DINFOS-BRTSM-008-006

UNIT TITLE: Microwave and Studio Link Systems

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Identify microwave and studio-transmitter-link (STL) and multi-channel and multi-post distribution systems and the principles of operation. Student competency will be assessed through written examinations that require the student to obtain a score of no less than 70 percent.

INSTRUCTIONAL TYPE AND HOURS: 2 L; 1 EW

TOTAL INSTRUCTIONAL HOURS: 3

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001- Identify microwave and studio-transmitter-links (STL): multi-channel and multi-post distribution system principles of operation (block diagrams)

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None

REFERENCES: NAB Engineering Handbook; Principles of Electronic Communications

FUNCTIONAL AREA 8
BROADCAST TRANSMISSION SYSTEMS

TPFN: DINFOS-BRTSM-008-007

UNIT TITLE: Cable Television (CATV) Systems

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): The student will set up and troubleshoot a CATV headend system, perform tap measurements, identify characteristics of fiber-optic cable and principles of light-wave broadcast communications as well as terminate fiber connectors and perform loss tests. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete the performance tasks in accordance with industry standards, and manufacturer's specifications.

INSTRUCTIONAL TYPE AND HOURS: 5.5 L; 2.5 D; 2 EW; 10.5 PE; 3.5 EP

TOTAL INSTRUCTIONAL HOURS: 24

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Analyze principles of multi-channel cable distribution, system hardware, design trade-offs, and performance measurements
002- Identify characteristics of fiber optic cable and principles of light-wave broadcast communications
003- Set up and troubleshoot CATV head end system
004- Perform tap measurements using field strength meter, spectrum analyzer, and system analyzer
005- Terminate fiber with connectors and perform loss check

INSTRUCTOR/STUDENT RATIO: 1:8 (L, D, EW) 1:4 (D, PE, EP)

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: NAB Engineering Handbook; Principles of Electronic Communications; Grass Valley Group Fiber-Optic tutorial; Corning Premises Optical Fiber tutorial

FUNCTIONAL AREA 8
BROADCAST TRANSMISSION SYSTEMS

TPFN: DINFOS-BRTSM-008-008

UNIT TITLE: Satellite Transmission

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Explain basic satellite antenna theory and system design. The student will discuss combined L-band and RF distribution systems. The student will identify satellite acquisition techniques (elevation, azimuth, and declination location). He or she will compare and contrast AFRTS Satellite services of SATNET, DTS, and HOTBIRD systems. Student competency will be assessed through written examinations that require the student to obtain a score of no less than 70 percent.

INSTRUCTIONAL TYPE AND HOURS: 12 L; 4 EW

TOTAL INSTRUCTIONAL HOURS: 16

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Explain satellite basic antenna theory and system design
002- Discuss combined L-band and RF distrubution systems
003- Identify satellite acquisition techniques (elevation, azimuth, and location)
004- Compare and contrast AFRTS Satellite Services (Virtual Channels, Audio, Video, Bit Rate, and data) of SATNET, DTS, and HOTBIRD

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None

REFERENCES: NAB Engineering Handbook; Principles of Electronic Communications; AFRTS Broadcast Center satellite handbook

FUNCTIONAL AREA 8
BROADCAST TRANSMISSION SYSTEMS

TPFN: DINFOS-BRTSM-008-009

UNIT TITLE: Emerging Technologies

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Identify principles of INMARSAT and Iridium Satellite phone systems and discuss emerging technologies to include IboC, 8VSB, and QAM. Student competency will be assessed through a written examination that requires the student to obtain a score of no less than 70 percent. The student will also be evaluated on his or her ability to prepare for and positively contribute to assigned discussions focusing on new/emerging technologies.

INSTRUCTIONAL TYPE AND HOURS: 2.5 L; 1 EW;

TOTAL INSTRUCTIONAL HOURS: 3.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001- Identify principles of INMARSAT and Iridium Satellite phone
002- Discuss emerging technologies to include IboC, 8-VSB, and QAM

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None

REFERENCES: NAB Engineering Handbook; Principles of Electronic Communications; AFRTS Broadcast Center satellite handbook

FUNCTIONAL AREA 9
CONTINGENCY TRAINING EXERCISE

TPFN: DINFOS-BRTSM-009-001

UNIT TITLE: Pre-Deployment (Collective training)

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): Identify contingency resources, to plan pre-deployment requirements, and to evaluate a site for satellite downlink. The student will also set up an AC power generator. Student competency will be assessed through written and performance examinations. The student must obtain a score of no less than of 70 percent on written exams and complete the performance task in accordance with US Army technical manual/s for the power generator.

INSTRUCTIONAL TYPE AND HOURS: 3 L; 1 D; 1 EW; 1.5 PE; 2.5 EP

TOTAL INSTRUCTIONAL HOURS: 9

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Identify contingency resources and planning
002- Evaluate site
003- Set up AC power generators

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: NAB Engineering Handbook; Principles of Electronic Communications; AFRTS Broadcast Center satellite handbook; US Army TMs 9-2815-252-24, 9-6115-659-137P, and 9-6115-641-24

FUNCTIONAL AREA 9
CONTINGENCY TRAINING EXERCISE

TPFN: DINFOS-BRTSM-009-002

UNIT TITLE: Deployment (Collective training)

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): As part of a maintenance team in a field environment that simulates contingency operations, the student will interconnect satellite and microwave equipment to set up a satellite-receiving site for AFRTS and DTS systems. The team will set up satellite signal decoders, perform system calculations for downlink design, acquire the signal, establish uplink/satellite communications and troubleshoot the satellite systems. The team will also set up low-power television and radio systems, interconnect antennas, align and troubleshoot contingency systems and perform field strength measurements. Student competency will be based on the team's ability to perform the tasks in accordance with DOD/AFRTS standards, industry standards, and manufacturers' specifications.

INSTRUCTIONAL TYPE AND HOURS: 24 EP

TOTAL INSTRUCTIONAL HOURS: 24

PREREQUISITE TPFN: All previous TPFNs

TASK(S):
001- Interconnect (satellite & microwave) equipment
002- Set up satellite receiving site (AFRTS and DTS)
003- Set up satellite signal decoders
004- Perform system calculations for uplink/downlink design
005- Acquire AFRTS SATNET/DTS signal
006- Troubleshoot satellite system
007- Set up low-power (TV-FM) systems
008- Set up and interconnect antennas (TV-FM)
009- Perform field-strength measurements
010- Align and troubleshoot contingency system (TV-FM)
011- Establish uplink/satellite communications

INSTRUCTOR/STUDENT RATIO: 1:4

SAFETY FACTORS: Student must follow all safety precautions pertaining to electrical shock, burns, fires, and the misuse of tools and equipment.

REFERENCES: NAB Engineering Handbook; Principles of Electronic Communications; AFRTS Broadcast Center satellite handbook; Manufacturers' operations and technical manuals

FUNCTIONAL AREA 9
CONTINGENCY TRAINING EXERCISE

TPFN: DINFOS-BRTSM-009-003

UNIT TITLE: Post-Deployment (Collective training)

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): The student will participate in an After Action Review facilitated by the instructor. The students first describe what the team and the individuals performed well, not so well, and how to improve their performance. Instructor observations are added to complete this phase of the training.

INSTRUCTIONAL TYPE AND HOURS: 1 PE (AAR)

TOTAL INSTRUCTIONAL HOURS: 1

PREREQUISITE TPFN: All previous TPFNs

TASK(S): 001- Conduct after action review of contingency operations

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None

REFERENCES: US Army Field Manual FM 25-101, Battle Focused Training

FUNCTIONAL AREA 10
COURSE ADMINISTRATION

TPFN: DINFOS-BRTSM-010-001

UNIT TITLE: Course Opening

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): The student will participate in in-processing activities including an orientation brief and welcome by the Commandant and staff.

INSTRUCTIONAL TYPE AND HOURS: 3 Admin

TOTAL INSTRUCTIONAL HOURS: 3

PREREQUISITE TPFN: None

TASK(S): 001- In-processing
002- Welcome and course orientation

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None

REFERENCES: None

FUNCTIONAL AREA 10
COURSE ADMINISTRATION

TPFN: DINFOS-BRTSM-010-002

UNIT TITLE: Course Closing

UNIT INTERMEDIATE TRAINING OBJECTIVE (ITO): The student will participate in an end-of-course critique, graduation ceremony, and out-processing activities.

INSTRUCTIONAL TYPE AND HOURS: 8 Admin

TOTAL INSTRUCTIONAL HOURS: 8

PREREQUISITE TPFN: None

TASK(S):
001- Course critiques
002- Graduation
003- Out-processing

INSTRUCTOR/STUDENT RATIO: 1:8

SAFETY FACTORS: None

REFERENCES: None